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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/493,104	01/28/2000	Ken Yoshioka	503.38156X00	1799

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EXAMINER

OLSEN, ALLAN W

ART UNIT	PAPER NUMBER
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1763

DATE MAILED: 03/19/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/493,104	Applicant(s) YOSHIOKA ET AL.	
	Examiner Allan Olsen	Art Unit 1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 December 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8 and 12-23 is/are pending in the application.
- 4a) Of the above claim(s) 12 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☐ Claim(s) 1-8 and 13-23 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
 If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
 a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on December 16, 2003 has been entered.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,069,035 issued to O'Donnell et al. (hereinafter, O'Donnell) in view of U.S. Patent 5,269,878 issued to Page et al. (hereinafter, Page) and further in view of US Patent 4,693,777 issued to Hazano et al. (hereinafter, Hazano)

O'Donnell teaches a method of etching a layer comprising a transition metal, such as PERMALLOYTM. O'Donnell's uses a plasma containing chlorine and argon to etch the metal layer while the temperature of the substrate support is maintained at 40°C. Following the chlorine etch step O'Donnell teaches a second step of rinsing the substrate with 90° C deionized water in order to remove chlorine residue from the etched substrate. O'Donnell teaches that the metal layer may be patterned by etching through a patterned photoresist mask. See: column 1, lines 10-20, 30-35, 62-65; column 5, 21-25; column 6, lines 34-35; column 5, line 66 – column 7, line 34.

O'Donnell does not teach drying a substrate on a hotplate after rinsing.

Like O'Donnell, Page teaches patterning a metal by etching with a chlorine plasma and rinsing the etched metal with water. In addition page teaches drying the substrate with a hot plate after it has been rinsed with water (column 4, lines 50-53; column 1, lines 64-65).

O'Donnell nor Page teach that the post etching steps occur in immediate succession and Page does not teach a maintaining a substrate temperature of less than 200° C during the hotplate drying step.

Hazano teaches carrying out post-etching treatments of rinsing and/or drying immediately after of a metal has been etched with a chlorine plasma. See column 3, line 66 – column 4, line 1; column 8, lines 35-40; and figure 11.

It would have been obvious to one skilled in the art to dry the substrate using a hot plate because Page and Hazano teaches that this is the typical method of drying substrates. It would have been obvious to one skilled in the art to not exceed a temperature 200° C because, Hazano teaches 200°C as an upper limit and O'Donnell is concerned with etching materials that are used in the manufacturing of magnetic heads and it is well known that elevated temperatures degrade the magnetic properties of these materials. It would have been obvious to one skilled in the art to conduct the post etching steps of rinsing and drying in immediately following the chlorine plasma etch because Hazano teaches that corrosion is reduced further by immediately carrying out the post etching steps.

Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over O'Donnell/Page/Hazano as applied to claim 1 above, and further in view of U.S. Patent 5,520,716 issued to Takagi et al. (hereinafter, Takagi).

As noted above, O'Donnell/Page/Hazano make obvious the limitations of claim 1. Additionally, it is noted that O'Donnell method is taught to have utility in the fabrication of magnetic heads. See column 1, lines 19-22 and column 7, lines 28-32.

O'Donnell does not teach that the PERMALLOYTM layer being etched is on a sintered $\text{Al}_2\text{O}_3/\text{TiC}$ substrate.

Takagi teaches a sintered $\text{Al}_2\text{O}_3/\text{TiC}$ substrate for magnetic heads.

It would have been obvious to one skilled in the art to use a sintered $\text{Al}_2\text{O}_3/\text{TiC}$ substrate when applying O'Donnell's method to the fabrication of a magnetic head because the sintered $\text{Al}_2\text{O}_3/\text{TiC}$ substrate of Takagi the fabrication of magnetic heads that have excellent smoothness. Also the head may be manufactured with high precision thereby proving heads with improved reliability.

Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,282,776 issued to Otsuka et al. (hereinafter, Otsuka) in view of the O'Donnell/ Page/Hazano combination.

Otsuka teaches a method of fabricating a magnetic head comprising each of the component layers recited in the instant claims (i.e. an upper pole made from an a NiFe alloy, a seed layer, a gap layer and a NiFe alloy lower pole/shield layer). Otsuka's method includes etching the seed layer and then plasma etching the gap layer with a Cl or F containing gas. See column 15, line 61 - column 16, line 21.

Otsuka does not teach removing chlorine or fluorine residue with a liquid rinse.

The above noted teachings of the O'Donnell/Page/Hazano combination are herein relied upon.

It would have been obvious to one skilled in the art to removing chlorine or fluorine residue from the structure of Otsuka by applying a liquid rinse as taught by O'Donnell because O'Donnell teaches that corrosion is prevented by removing the chlorine and fluorine residues with a liquid rinse. For the above stated reasons, it would have been obvious to one skilled in the art to conduct the post etch rinse and 200° C drying steps immediately following the plasma etch.

Claims 13, 15-18, 20, 22 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Otsuka in view of O'Donnell/Page/Hazano as applied to claim 14 above and further in view of U.S. Patent 5,607,599 issued to Ichihara et al. (hereinafter, Ichihara).

Otsuka does not teach plasma etching the seed or shield layers with argon and chlorine.

Ichihara teaches etching NiFe alloy layers such as seed and shield layers with an argon and chlorine plasma. See column 4, lines 27-48

It would have been obvious to one skilled in the art to use the plasma etching method of Ichihara because Ichihara teaches that the use of Ar and BCl₃ allows one to obtain a high degree of etching selectivity between the various layers of the magnetic head as well as providing a means of fabricating the a magnetic head while maintaining a low processing temperature.

Response to Arguments

Applicant's arguments filed December 16, 2003 have been fully considered but they are not persuasive. Applicant argues that Page is directed to solving the corrosion problem that occurs from the chlorine plasma etching of a Ti/W- Cu/Al- Ti/W laminate while O'Donnell and the present invention are directed to solving the corrosion problem that occurs from the chlorine plasma etching of a laminate containing NiFe and/or NiFeCo. Because of the different metals, Applicant argues there would be no motivation to combine the two methods.

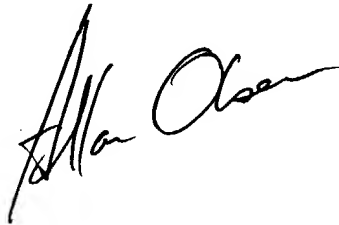
The examiner notes that Page teaches the method is generically applicable to metals. While Ti, W, Al and Cu are the only metals explicitly recited by Page, Page addresses the problem of chlorine residue causing corrosion of metals. As chlorides (e.g., HCl) are well known to be corrosive towards the vast majority of metals, including the claimed NiFe(Co) alloys, the skilled artisan would instantly recognize that the teaching of Page are applicable to the NiFe(Co) alloys of O'Donnell.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Allan Olsen whose telephone number is 571-272-1441. The examiner can normally be reached on M-F 1-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Greg Mills can be reached on 571-272-1439. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read "Allan Olsen", written in a cursive style.

Allan Olsen
Primary Examiner
Art Unit 1763